engineering laboratory

# Model-Based Research in Smart Manufacturing

MBE Summit

Gaithersburg, Maryland

12 April 2016

NIST
National Institute of Standards and Technology
U.S. Department of Commerce

# Smart Manufacturing Programs at NIST

- Smart Manufacturing Systems Design and Analysis
  - Program Manager: Simon Frechette
  - URL: http://www.nist.gov/el/msid/syseng/smsda.cfm
- Smart Manufacturing Operations Planning and Control
  - Program Manager: Allison Barnard Feeney
  - URL: http://www.nist.gov/el/msid/syseng/smopc.cfm

# Smart Manufacturing Systems Design and Analysis Projects

- Modeling Methodology for Smart Manufacturing Systems
- Performance Assurance for Smart Manufacturing Systems
- Predictive Analytics for Smart Manufacturing Systems
- Service-Oriented Architectures for Smart Manufacturing

# Smart Manufacturing Operations Planning and Control Projects

- Cybersecurity for Smart Manufacturing Systems
- Digital Thread for Smart Manufacturing
- Prognostics, Health Management, and Control
- Systems Analysis Integration for Smart Manufacturing Operations
- Wireless Platforms for Smart Manufacturing

# Presentation Objectives

- Provide an overview of the research in smart manufacturing that relates most closely to model-based enterprise
- Tell the story of linked data through the entire product lifecycle to create a “data observatory”
- Supply examples of data-driven applications that would be enabled by linked data



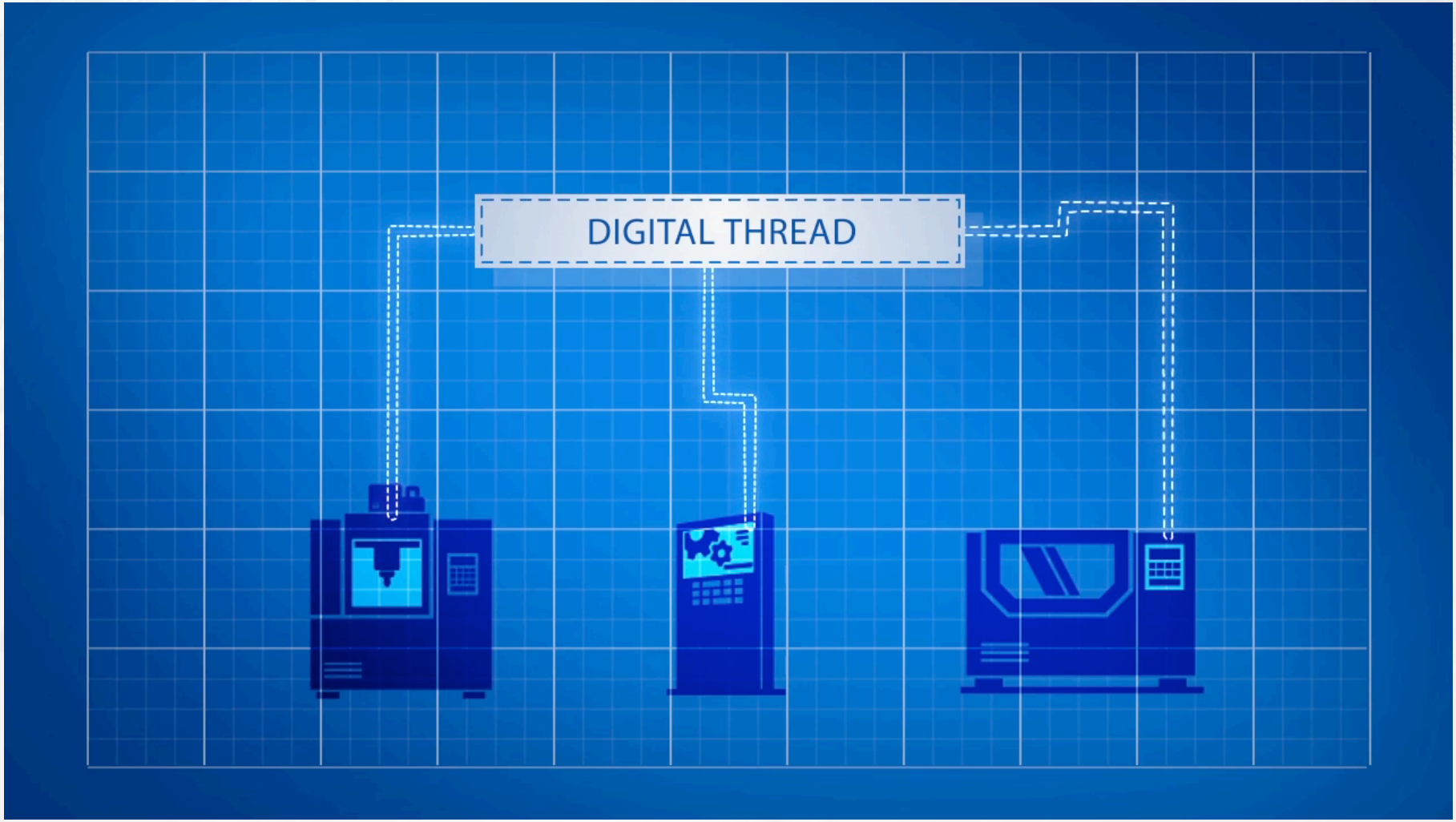
# Setting the Stage: Lifecycle Information Framework

Tom Hedberg

Systems Integration Division

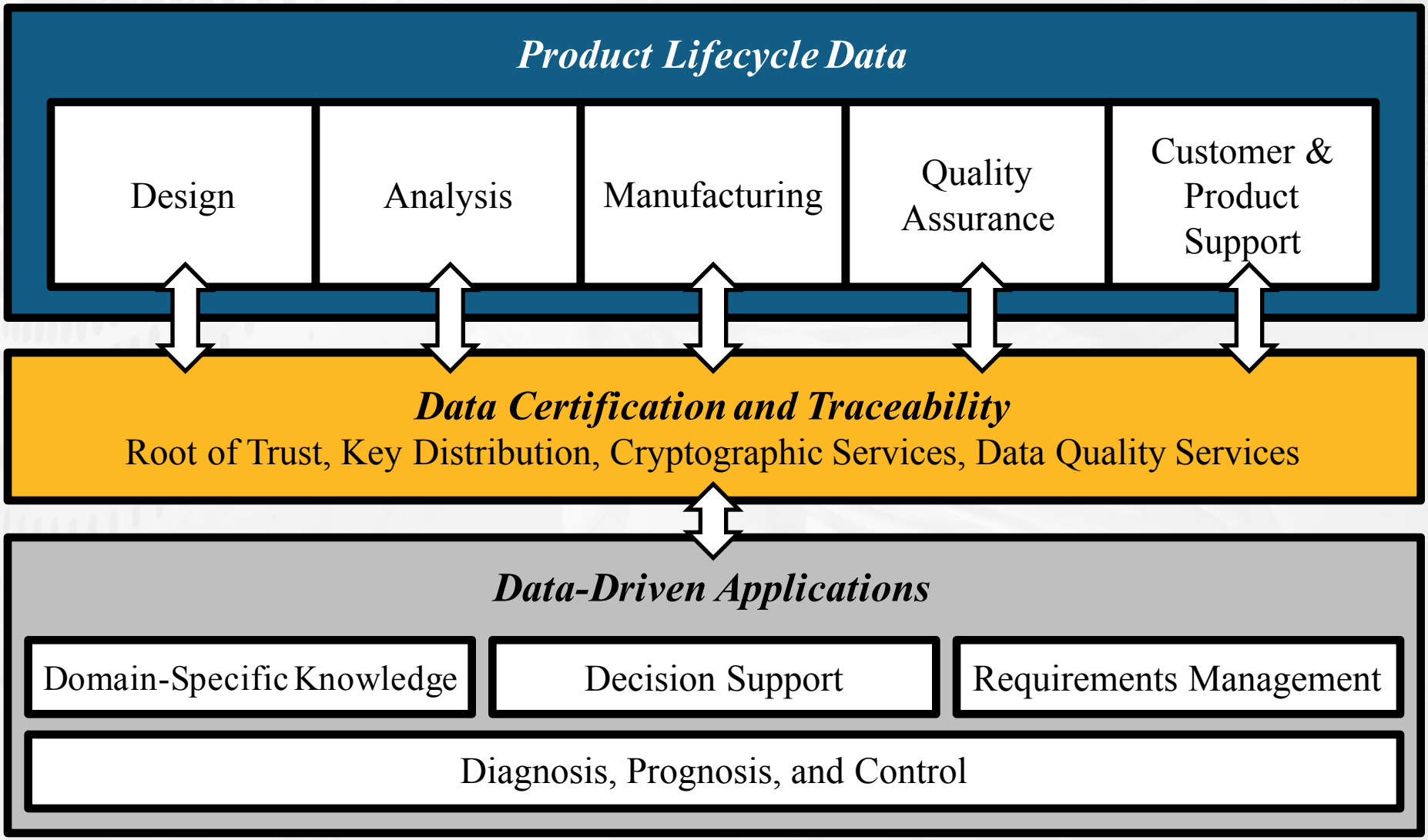
NIST
National Institute of Standards and Technology
U.S. Department of Commerce

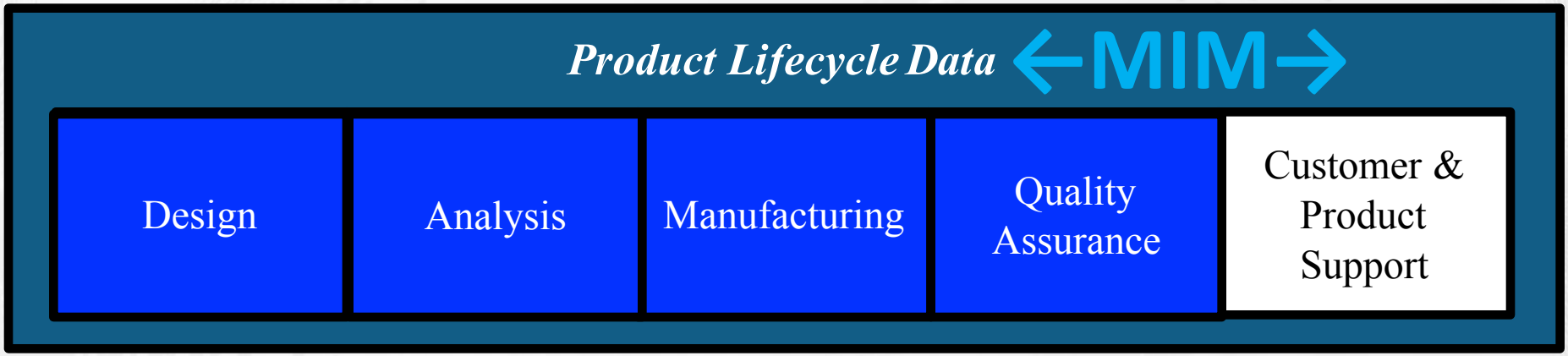
# Putting the Digital Thread in Context




Materese, R., Gerskovic, L., Hedberg Jr, T., & Madden, J. J. (2015). The Digital Thread: Stitching Together the Next Industrial Revolution. Gaithersburg MD: National Institute of Standards and Technology. Retrieved from https://www.youtube.com/watch?v=iGtM8VGLn5M.

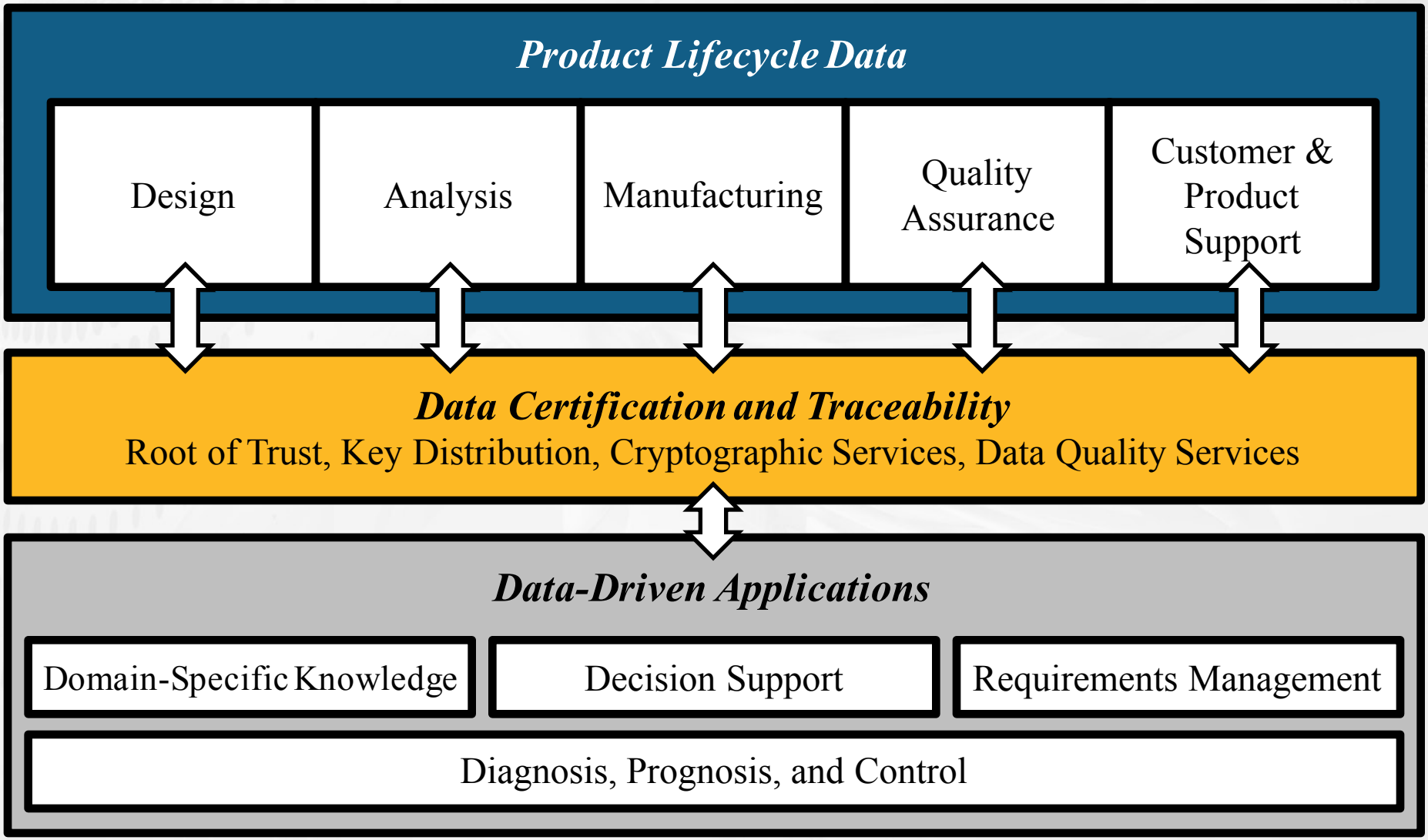
# Lifecycle Information Framework






1. Robert Lipman: Enabling the Digital Thread for Smart Manufacturing
2. Peter Denno: Modeling Methodology for Smart Manufacturing
3. Conrad Bock: Systems Analysis Integration for Smart Manufacturing Operations
4. John Horst: Enabling Quality Interoperability
5. Nate Hartman: Defining the Minimum Information Model

# Lifecycle Information Framework

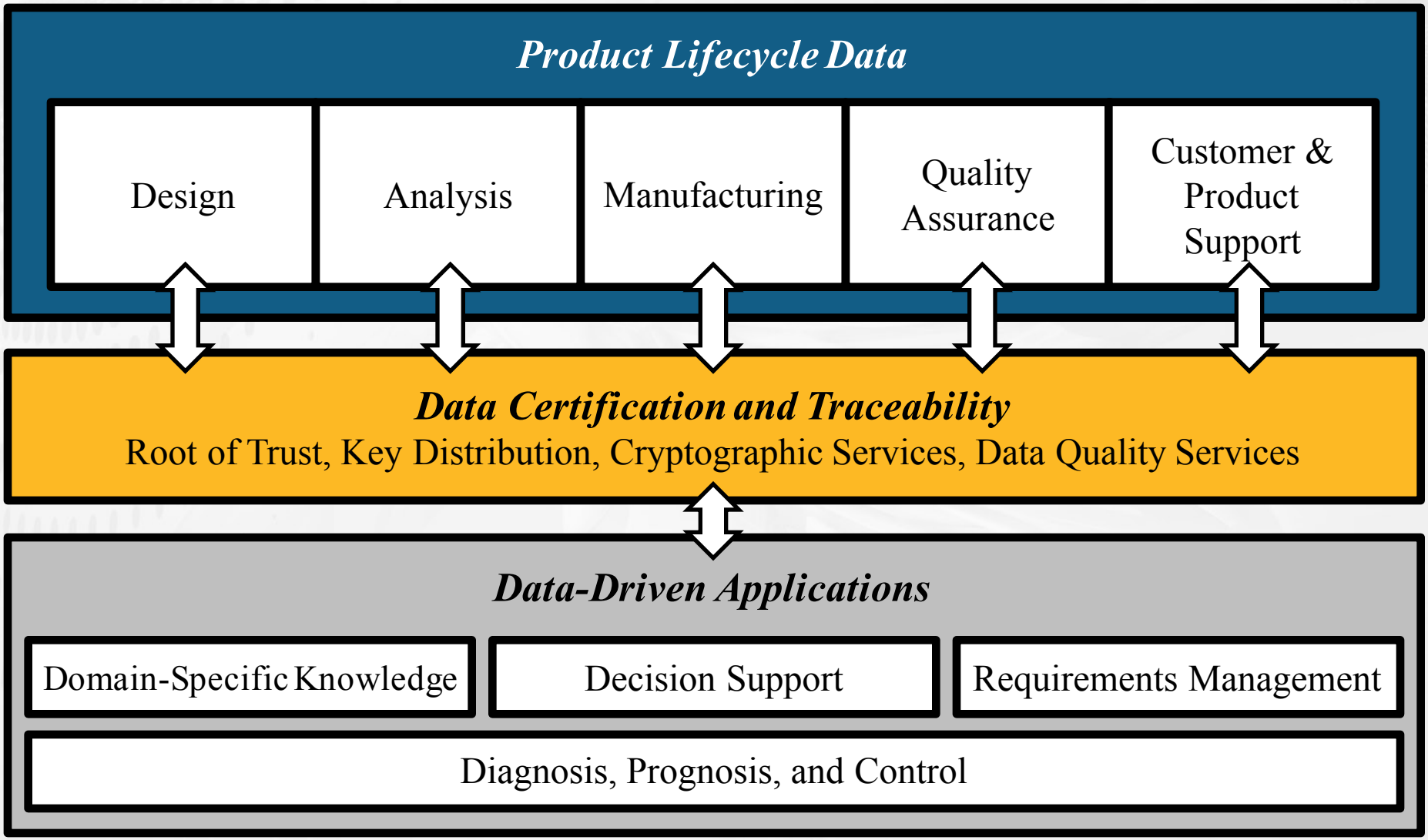


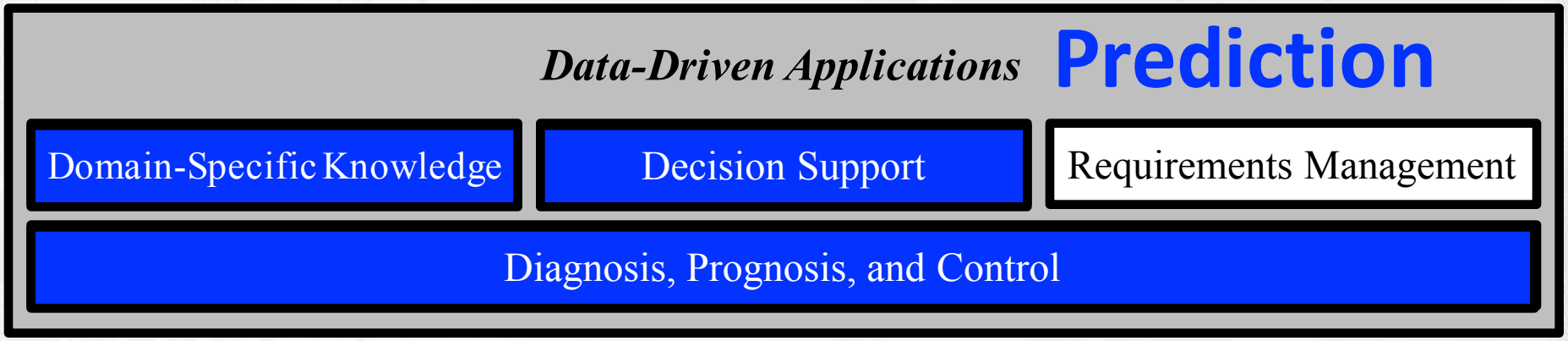
***Data Certification and Traceability***

Root of Trust, Key Distribution, Cryptographic Services, Data Quality Services

6. Sylvere Krima: Using Digital Manufacturing Certificates for Authentication, Authorization, and Traceability of Product Data

# Lifecycle Information Framework






7. Ronay Ak: Predictive Analytics for Smart Manufacturing
8. Bill Bernstein: Visualizing Data for Smart Manufacturing
9. Brian Weiss: Data-driven Prognosis, Health Monitoring, and Control for Smart Manufacturing
10. Moneer Helu: NIST SMS Test Bed

# Lifecycle Information Framework